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RATIONS for your laying hens

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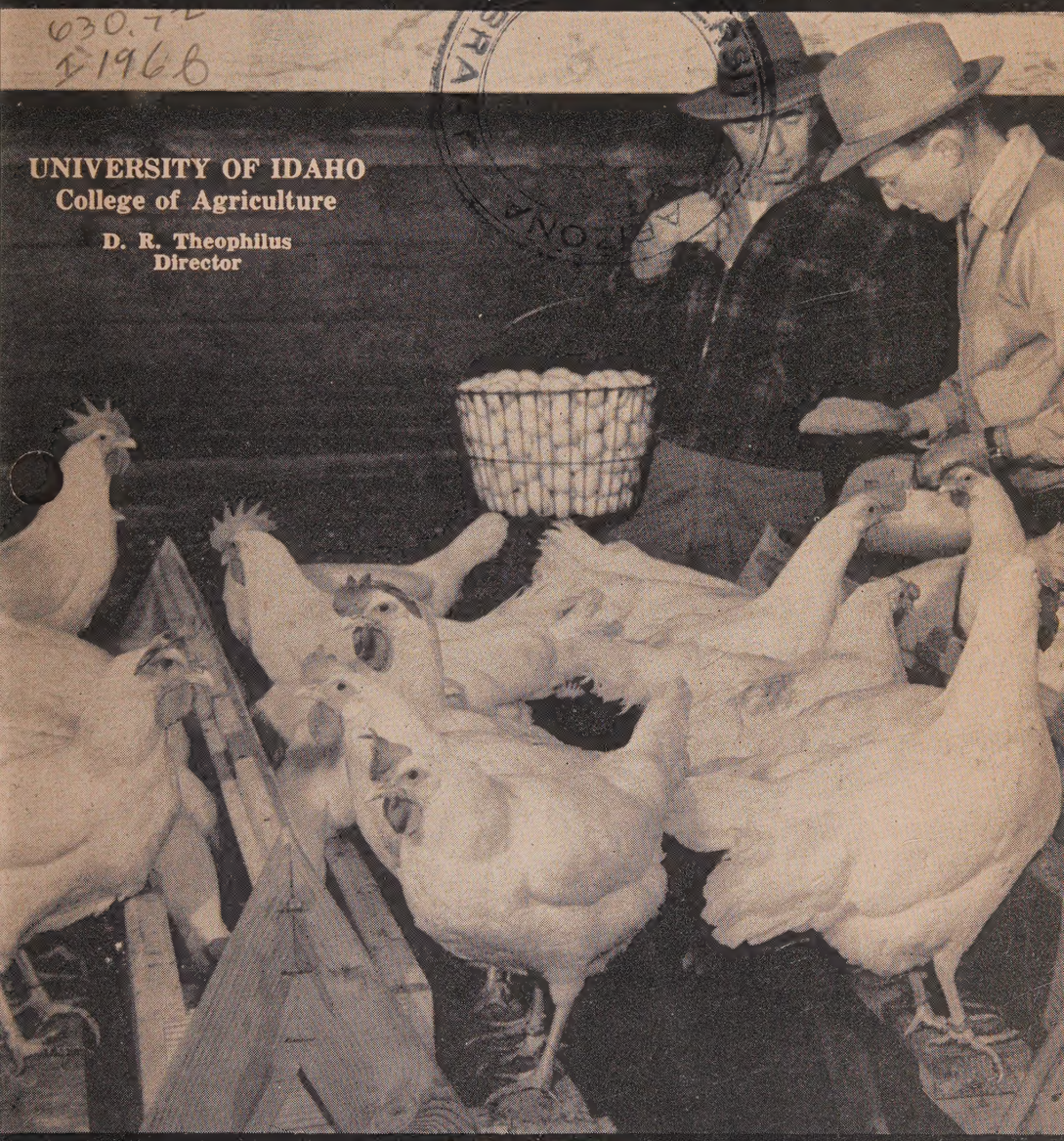
College of Agriculture
D. R. Theophilus
Director



A Good Ration

- Produces a maximum number of large, high quality eggs at the lowest possible feed cost.
- Maintains health, body weight, and vitality of the layers.
- Maintains fertility and high hatchability in breeders.
- Is palatable and stimulates full consumption.

ISSUED IN FURTHERANCE OF THE ACTS OF MAY 8 AND JUNE 30, 1914

Suggested Laying Mash Formulas

amounts on 1000 lb. basis

Ingredients	1	2	3	4
	Pounds	Pounds	Pounds	Pounds
Millrun or bran	250	250	250	240
Ground oats	200	150	150	100
Ground barley	210	150	150	100
Ground wheat		75		
Ground corn			100	150
Dehydrated alfalfa meal	75	75	50	100
Meat meal	200	125	100	75
Fish meal			25	50
Soybean oil meal		100	100	50
Corn gluten meal				50
Dried whey	40	35	35	35
Riboflavin concentrate*				*
Oyster shell flour	10	20	25	20
Bone meal		5	10	15
Salt	10	10	10	10
Manganese sulfate	¼	¼	¼	¼
Fortified fish oil (400D-2000A or 3000A)	5	5	5	8
TOTAL	1,000	1,000	1,010	1,003
Approximate Composition				
Protein, percent	20.0	20.0	20.0	20.0
Calcium, percent	2.5	2.3	2.4	2.3
Phosphorus, percent	1.4	1.2	1.2	1.2

Explanation of Formulas

Nos. 1, 2, and 3 are recommended for laying flocks not used as breeders. They differ primarily in the protein concentrates included.

No. 4 is for breeding flocks. It is fortified with additional fish meal and vitamins essential for hatchability and chick quality.

*Riboflavin concentrates may be substituted for dried whey in formulas 1, 2, and 3 and used in addition to the whey in No. 4 for breeders. These concentrates vary in potency, see page 4—use according to manufacturer's instructions.

Rations for Your Laying Hens

C. E. LAMPMAN, C. F. PETERSEN,
PREN MOORE, AND REID MERRILL*

Laying hens must have complete rations to maintain high egg production and good health. Their mash requires the greatest attention because it is that part of the ration which contains the **protein, vitamins,** and **minerals.** Well-bred Leghorn hens need from 5 to 6 pounds of such a ration to produce a dozen eggs. A deficiency of any one of the essential supplements will result in lower production, higher costs, and a greater chance of disease. **For greatest efficiency, feed good stock to capacity with a well-balanced ration. Cull the poor layers.**

What Laying Hens Need in a Good Mash

A good mash consists of a combination of ground grains and mill feeds properly supplemented with proteins, vitamins, and minerals. The quality of the ingredients is important. The tag on the sack gives the amounts of protein, ash, fat, moisture, and fiber, but it does not give you information on the quality of such important ingredients as alfalfa, proteins, and vitamin concentrates. Use this circular as a guide for the essential requirements and the proper proportion of ingredients—why they are needed, and how you can supply them.

The formulas on page 2 give information on suggested amounts of ingredients to use. Below is a brief description of the ingredients. You will find a table on page 8, having the approximate composition of various feedstuffs. Be consistent in using a formula, avoid frequent changes—and, when you make them, do it gradually.

Ground grains and mill feeds usually make up 60 to 75 percent of the mash. The exact amount of each may vary according to the available supply.

Flaky millrun or bran adds bulk and makes the mash coarser—use at least 20 percent. The hens eat a coarse mash more readily.

Oats and barley need to be finely ground because of the fiber. The combination of the two should not exceed one-half of the mash.

Grind wheat and corn coarsely. Corn is desirable if you have it, but it is not necessary. Wheat, oats, and barley are lacking in vitamin A.

Proteins for More and Larger Eggs

Your laying mashes should contain about 20 percent protein when fed with equal parts of scratch grain. A combination of fish meal, meat meal,

*C. E. Lampman, Poultry Husbandman, C. F. Petersen, Associate Poultry Husbandman, Agricultural Experiment Station; Pren Moore, Poultryman, Reid Merrill, Assistant Poultryman, Agricultural Extension Division.

and soybean oil meal is desirable when they are all available. We have included them in formulas 3 and 4. However, your hens will lay well on simpler rations such as meat meal alone as in Formula 1, or meat meal with soybean oil meal as in Formula 2.

Meat meals vary in amount and quality of protein. Products now on the market range from 48 to 57 percent protein. Quality is influenced by the method of processing. The better quality meals contain less fiber, blood offal, and bone. Laying hens make better use of the meat meal protein for egg production than young chicks do for growth. In feeding trials at the Idaho Experiment Station the rendering plant meat meals have proved slightly better than the packing plant meals.

Fish meals vary in protein content. Sardine meals contain approximately 65 percent protein, herring meal about 70 percent. Their proteins and other nutrients are more important for hatchability and early chick growth than for production of market eggs.

Soybean oil meals vary in protein content according to processing methods. Manufacturers usually guarantee 41 percent protein in the expeller-process meal and 44 percent in the solvent-process meal. Soybean oil meal is one of the most complete plant proteins, but it is low in riboflavin, minerals, and other factors necessary for hatchability. In Idaho it does not seem practical to use the high levels recommended in other areas.

Vitamins for Health, Eggs, and Hatchability

Vitamins A, D, and riboflavin are the three we must add to make the ration complete. Natural feedstuffs will supply enough of the other needed vitamins.

Vitamin A—A lack of vitamin A results in reduced health, lower egg production, colds, and nutritional roup. In extreme cases the birds develop watery and swollen eyes, the throat is covered with tiny white abscesses, as shown in Figure 1, and the kidneys become enlarged and congested. Good alfalfa, fish liver oils, succulent green feed, and yellow corn are practical sources of vitamin A.

Alfalfa meal of good quality is a good and practical source of vitamin A, riboflavin, and several other essential nutrients. The amount of these vitamins in alfalfa meal varies widely. Sunlight, rain, and high temperatures destroy them easily. Much of the vitamin A disappears when hay is cured in the field. Dehydrated alfalfa meal is, therefore, better for poultry rations. As a second choice, use good, green-colored, leafy hay. The color of the meal is not an accurate measure but a rich green color is associated with higher levels of vitamins.

Vitamin D—The lack of vitamin D causes crooked keels, thin shells, poor hatchability, and deficient chicks. Fish oils and several dry D concentrates are our main sources of this vitamin.

Fish oils—You can buy fortified fish oil concentrates in several potencies of both vitamins A and D. In the formulas on page 2 we suggest the more common oils containing 400 units of vitamin D and 1000 to 3000 units of vitamin A per gram. Because the vitamin A content of alfalfa meal varies so much, the higher "A" potency oil is more necessary in white grain rations. Some commercial feed mixers prefer oils of higher vitamin concentration, such as 800D and 2000A or 4000A.

Thoroughly pre-mix the oil by blending it with one of the mash ingredients, preferably the millrun. Then thoroughly mix this pre-mix into the rest of the mash.

Figure 1. Small abscesses or pustules cover the lining of the throat and oesophegus because of a lack of vitamin A in the ration.

Dry D concentrates—Several vitamin D concentrates in powdered form are also available. These so-called dry D concentrates are from 2½ to 5 times as potent as the 400D oils. Most of them contain no vitamin A. These concentrates are used in such small quantities that it is difficult to mix them properly without special equipment.

Riboflavin (Vitamin G)—A deficiency of this vitamin causes poor health, low feed consumption, reduced egg production, and low hatchability. Breeders require much higher levels for high hatchability and good quality chicks than layers require for the production of market eggs. The more important sources are fresh succulent green feed, milk products, good dehydrated alfalfa, and numerous commercial riboflavin concentrates.

Riboflavin concentrates—Many commercial products, with a wide range in riboflavin content, are now used in poultry rations. Dried whey which contains 12 units of riboflavin (milligrams per lb.) is used as a basis for comparison. Such supplements as distillers' by-poducts contain 5 to 8 units. Other products of higher concentration include the dried fermentation solubles, which should contain a minimum of 18 units. There are concentrates now available which contain 200, 2000, and 4000 units of riboflavin. In general,

use them according to the manufacturer's recommendation. Because these products of higher concentration are used in such small amounts, special premixing equipment is necessary.

Milk products (feed grade)—Dried skimmilk and dried buttermilk are good sources of high quality proteins, riboflavin, and other B-complex vitamins but are not now generally available. Dried whey is also a good source of riboflavin and other B-complex vitamins but is low in protein. Becaues of its laxative effect upon the birds, do not use more than 5 percent.

Either liquid skimmilk or buttermilk is a valuable supplement when used regularly. For example, liquid skimmilk fed daily at the rate of 4 to 5 gallons per 100 hens will furnish enough protein so that the mash will not need supplementary protein concentrates. Milk proteins efficiently supplement the protein of peas. Three gallons of skimmilk daily per 100 hens fed in combination with a mash containing 25 percent of ground cull peas and 5 percent meat meal has repeatedly given satisfactory egg production. The riboflavin and other vitamins in the liquid milk have a very beneficial influence on the general health of the flock.

Minerals for Efficient Performance and Sound Shells

You will need to add salt, calcium, phosphorus, and manganese to your laying mash. Salt is essential for normal body functions and makes the mash more palatable. Iodized salt is preferable if you are using high levels of soybean oil meal. Use 1 percent of finely granulated salt free from lumps in all mashes fed with grain. Blend it well into the mixture.

Calcium and phosphorus are required in the proportion of 2 percent calcium to 1 percent of phosphorus, illustrated in the formulas on page 2. Bone meal supplies both of these minerals; oyster shell supplies only calcium. High levels of meat meal, such as in formula No. 1, supply enough phosphorus so that additional bone meal is not needed. Bone meal is needed, however, to supply additional phosphorus when soybean oil meal replaces most of the animal proteins. Laying hens need extra calcium for egg shells.

Supplementary manganese is needed particularly by breeding birds producing eggs that give high hatchability and normal chick development. Include it in all laying mashes in the form of feed grade manganese sulfate.

Other minerals which promote normal health and production are present in sufficient amounts in practical rations. Additions of complex mineral mixtures are not necessary.

Oyster shell and grit—Be sure your hens always have these before them in separate feeders. A constant supply of shell is extremely necessary when your hens are in high production. Do not allow fine material to accumulate. The hens will not eat it. It is possible to substitute high-grade calcite or limestone for oyster shell. Be sure it is low in magnesium.

Base-mix Concentrates

Commercial base-mix concentrates of protein and mineral supplements are available to use with ground grains, mill feeds, and vitamin supplements

for poultry mashes. These products usually range from 32 to 38 percent protein. The following sample mix illustrates the use of a 36 percent protein base-mix concentrate in making a 20 percent protein laying mash:

100 lb. commercial base-mix concentrate	@ 36%	protein =	36.0 lb. protein
130 lb. ground grains	@ 10%	" =	13.0 lb. "
50 lb. millrun	@ 14%	" =	7.0 lb. "
20 lb. dehydrated alfalfa	@ 17%	" =	3.4 lb. "

2 qts. fish oil (400D-2000A)

300 lb. total mash mixture ..... 59.4 lb. protein

59.4 lb. protein divided by 300 lb. mash ..... = 19.8% protein

Scratch Grain Mixtures

Any reasonable combination of local grains is satisfactory. Wheat is usually the principal grain. A combination of whole oats and rolled barley may make up as much as one-half of the mixture. Hens eat barley more readily when it is steam rolled. Feed yellow corn if you can get it at a reasonable price.

Feeding Practices

We have found that the following feeding practices lead to good results: (1) a well-blanced mash, (2) regularity of feeding, (3) a reasonable proportion of mash and grain to maintain a balanced ration, (4) a full grain feed at night before birds go to roost, (5) maximum feed consumption by hens in high production, and (6) plenty of mash hopper space—at least 24 feet of feeding space per 100 hens.

Feed grain liberally during the fall and winter. Pullets must increase their body weight along with good production. Supply whole oats in separate feeders to promote good feathering and to prevent cannibalism. You can feed both whole oats and whole wheat in separate feeders instead of hand feeding the grain at night.

Check often on the proportions of mash and grain eaten, especially when you provide grain in self-feeders. See that mash averages about one-half of the total feed. Reduce the grain ration if the birds are too fat or are not eating enough mash.

Feed fresh mash often but make the hens clean up the fine feed in the bottom of the feeder.

Hens in continuous high production usually need additional vitamins. Extra vitamin A will help maintain health. Extra vitamin D will help maintain or improve shell strength and texture.

Save feed! Expensive mash is often badly wasted! Use a feeder with lips on verticle sides and a reel over the top. Do not fill more than half full.

Use artificial lights during the fall and winter to provide a 12 to 13-hour day.

Amount of Feed for High Production

Feed consumption varies with the size of the bird and rate of egg production. One hundred Leghorn hens will eat approximately 24 pounds of feed daily when laying at the low rate of 35 eggs per day and about 28 pounds per 100 hens when laying at the rate of 65 to 70 eggs. The extra 4 pounds is essential for high production but is only a small portion of total production costs. Hens of heavy breeds require from 30 to 32 pounds per 100 hens daily when in high production.

Use a Breeder Ration for Breeding Stock

During heavy production laying hens lose their reserve of nutritional factors necessary for high hatchability and good chick quality. Use a breeder mash well fortified with alfalfa, fish meal, fish oil, and riboflavin concentrates for any flock used for breeders. (See formula 4, page 2.) Use a minimum of 2.5 percent of fish meal or 3.5 percent of a dried milk product, or both.

Approximate Composition of Feeds

	Protein	Fat	Fiber	Ash	Calcium	Phosphorus
Barley	9-10.0	2.0	5.7	2.7	0.05	0.36
Corn	9-10.0	3.9	2.0	1.4	0.01	0.28
Oats	10-12.0	4.5	11.0	3.8	0.10	0.35
Wheat (Av.)	12.0	2.0	2.7	2.0	0.04	0.40
Wheat (soft white)	8-10.0	2.0	2.6			
Peas	21-24.0	1.5	8.8			
Bran or millrun (Av.)	15.0	4.4	9.5	6.0	0.12	1.20
Bran (soft wheat)	13-14.0		8.7			
Shorts	14-16.0	4.5	7.0	4.4	0.10	0.90
Alfalfa meal (leafy)	15-16.0	2.5	28.0	8.0	1.50	0.25
Alfalfa meal (dehyd.)	17-18.0	2.8	25.0	8.5	1.60	0.30
Fish meal	65-70.0	7.0	1.5	12.0	3.80	2.50
Meat meal	50-55.0	8.0	2.5	27.0	9.00	4.50
Soybean oil meal	41-44.0	5.0	6.0	6.0	0.30	0.66
Corn gluten meal	43.0	2.0	2.6	1.6	0.10	0.45
Milk (dried skim)	34.0	0.9		8.0	1.30	1.00
Whey (dried)	12.5	0.7		9.7	0.90	0.70
Bone meal (steamed)	7.0	3.0	1.0	81.0	31.00	14.00
Di-calcium phosphate (deflourinated)				100.0	24.00	18.00
Oyster shell				60.0	38.00	

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